Internet Based Supply Chain Strategies

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Outline

• Supply Chain Dynamics
• Supply Chain Integration
  – A new Supply Chain Paradigm
• E-Business Strategies
  – Business-to-Consumer
  – Strategic Pricing
  – Business-to-Business

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Sources

• Books
  - Designing and Managing The Supply Chain
    Publisher: McGraw-Hill, 1999
  - The Logic of Logistics
    Publisher: Springer, 1997

• Articles

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The Dynamics of the Supply Chain

Source: Tom Mc Guffry, Electronic Commerce and Value Chain Management, 1998

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We Conclude:

In Traditional Supply Chains….

• Order Variability is amplified up the supply chain; upstream echelons face higher variability.

• What you see is not what they face.
The Bullwhip Effect

P&G      Retailers      Customers

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What are the Causes….

- Promotional sales
- Volume and Transportation Discount
- Inflated orders
  - IBM Aptiva orders increased by 2-3 times when retailers thought that IBM would be out of stock over Christmas
  - Same with Motorola’s Cellular phones
• Single retailer, single manufacturer.
  - Retailer observes customer demand, $D_t$.
  - Retailer orders $q_t$ from manufacturer.
What are the Causes....

• Promotional sales
• Volume and Transportation Discount
• Inflated orders
  - IBM Aptiva orders increased by 2-3 times when retailers though that IBM would be out of stock over Christmas
  - Same with Motorola’s Cellular phones
• **Demand Forecast**
• **Long cycle times**
• Single retailer, single manufacturer.
  – Retailer observes customer demand, $D_t$
  – Retailer orders $q_t$ from manufacturer.
Consequences....

- Increased safety stock
- Reduced service level
- Inefficient allocation of resources
- Increased transportation costs
The Future is Not What it Used to Be

• A new e-Business Model
  – Reduce cost
  – Increase service level
  – Increase flexibility
  – Increase Profit

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Reality is Different…..

• On-line Furniture Industry
  – After an investment of $70M Living.com declared bankruptcy in August 2000
  – Logistics brought the recent downfall of Furniture.com after about 20 months of operation

• On-line Grocery Industry
  – Shoplink.com, Streamline.com, Web van recently retired from this market
  – Peapod escaped this fate when it was sold to Royal Ahold after heavy losses
Reality is Different.....

• **Amazon.com Example**
  - Founded in 1995
  - 1996: $16M Sales, $6M Loss
  - 1999: $1.6B Sales, $720M Loss
  - 2000: $2.7B Sales, $1.4B Loss
  - Last quarter of 2001: $50M Profit
    - Total debt: $2.2B
Reality is Different….

- Dell Example:
  - Dell Computer has outperformed the competition in terms of shareholder value growth over the eight years period, 1988-1996, by over 3,000% (see Anderson and Lee, 1999)
The e-Business Model

- e-Business is a collection of business models and processes motivated by Internet technology, and focusing on improving the extended enterprise performance
  - e-commerce is part of e-Business
  - Internet technology is the driver of the business change
  - The focus is on the extended enterprise:
    - Intra-organizational
    - Business to Consumer (B2C)
    - Business to Business (B2B)
A new Supply Chain Paradigm

• A shift from a Push System…
  – Production decisions are based on forecast

• …to a Push-Pull System
  – Parts inventory is replenished based on forecasts
  – Assembly is based on accurate customer demand
Demand Forecast

• The three principles of all forecasting techniques:
  – Forecasts are always wrong
  – The longer the forecast horizon the worst is the forecast
  – Aggregate forecasts are more accurate
    • The Risk Pooling Concept
A new Supply Chain Paradigm

- A shift from a Push System...
  - Production decisions are based on forecast
- ...to a Push-Pull System
Push-Pull Supply Chains

PUSH STRATEGY

<p>| |</p>
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
</table>

PULL STRATEGY

Push-Pull Boundary

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A new Supply Chain Paradigm

• A shift from a Push System…
  – Production decisions are based on forecast

• …to a Push-Pull System
  – Parts inventory is replenished based on forecasts
  – Assembly is based on accurate customer demand
to Assemble-to-Order Model

Suppliers  Assembly  Configuration
Demand Forecast

• The three principles of all forecasting techniques:
  - Forecasts are always wrong
  - The longer the forecast horizon the worst is the forecast
  - Aggregate forecasts are more accurate
    • The Risk Pooling Concept
Business models in the Book Industry

- From Push Systems…
  - Barnes and Noble
- ...To Pull Systems
  - Amazon.com, 1996-1999
- And, finally to Push-Pull Systems
  - Amazon.com, 1999-present
    - 7 warehouses, 3M sq. ft.,
Direct-to-Consumer: Cost Trade-Off

Cost Trade-Off for BuyPC.com

![Graph showing cost trade-off for BuyPC.com]
Business models in the Grocery Industry

• From Push Systems…
  – Supermarket supply chain

• ...To Pull Systems
  – Peapod, 1989-1999
    • Stock outs 8% to 10%

• And, finally to Push-Pull Systems
  – Peapod, 1999-present
    • Dedicated warehouses
    • Stock outs less than 2%
Business models in the Grocery Industry

• Key Challenges for e-grocer:
  – Transportation cost
    • Density of customers
  – Very short order cycle times
    • Less than 12 hours
  – Difficult to compete on cost
    • Must provide some added value such as convenience
e-Business in the Retail Industry

- Brick-&-Mortar companies establish Virtual retail stores
  - Wal-Mart, K-Mart, Barnes and Noble
- Use a hybrid approach in stocking
  - Fast moving/High volume products for local storage
  - Slow moving/Low volume products for on-line purchase
- Channel Conflict Issues
# E-Fulfillment Requires a New Logistics Infrastructure

<table>
<thead>
<tr>
<th></th>
<th>Traditional Supply Chain</th>
<th>e-Supply Chain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply Chain Strategy</td>
<td>Push</td>
<td>Push-Pull</td>
</tr>
<tr>
<td>Shipment Type</td>
<td>Bulk</td>
<td>Parcel</td>
</tr>
<tr>
<td>Inventory Flow</td>
<td>Unidirectional</td>
<td>Bi-directional</td>
</tr>
<tr>
<td>Reverse Logistics</td>
<td>Simple</td>
<td>Highly Complex</td>
</tr>
<tr>
<td>Destination</td>
<td>Small Number of Stores</td>
<td>Highly Dispersed Customers</td>
</tr>
<tr>
<td>Lead Times</td>
<td>Depends</td>
<td>Short</td>
</tr>
</tbody>
</table>

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Matching Supply Chain Strategies with Products

Demand uncertainty (C.V.)

Pull

H

Push

L

Delivery cost
Unit price

Pull

Push

I
Computer

II
Furniture

IV
Books & CDs

III
Grocery

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Locating the Push-Pull Boundary

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Outline

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• E-Business Strategies
  – Business-to-Consumer
  – Strategic Pricing
  – Business-to-Business
Smart Pricing?

• Dell:
  - Same product is sold at a different price to different consumers (private/small or large business/government/academia/health care)
  - Price of the same product for the same industry is nothing but fixed

• Amazon
  - Books.com had a lower price than Amazon 99% of the time, yet Amazon had 80% of the market in 2000 while Books.com only 2%

• Nikon, Sharp…
  - Mail-In-Rebate

• Boise Cascade office
  - Prices of 12,000 items sold on-line may change as often as daily
Nikon
Coolpix® Digital Camera Rebate
$100.00 • Coolpix 995

How To Receive Your Nikon Rebate

2. Complete the application below, attach all required proofs-of-purchase for each eligible product and mail to Nikon.
3. Subject to you fulfilling all terms of this offer, Nikon Inc. will mail you a rebate check within 4-6 weeks.

Please read complete Terms of Offer on reverse side.

<table>
<thead>
<tr>
<th>Product</th>
<th>Product #</th>
<th>Rebate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coolpix 995</td>
<td>25047</td>
<td>$100.00</td>
</tr>
</tbody>
</table>

Complete this section, enclose proofs-of-purchase & mail to:
Nikon Coolpix Rebate • P.O. Box 6602 • Melville, New York 11775-6602

Dealer Purchased From:

Name: _______________________
Address: _____________________
City: __________ State: ______ Zip: ______

Your Information:

Name: _______________________
Address: _____________________
City: __________ State: ______ Zip: ______
E-mail: ______________________
Signature: ______________ Date of Purchase: ______

Please indicate any Nikon camera(s) you own:
F5, F100, N90(s), Coolpix, N65, N70, N80, Other: ______________

YOU MUST ENCLOSE FOR EACH ELIGIBLE PRODUCT:
1. Copy of your bill of sale
2. UPC code label from side panel of box
3. Social number label with bar code from side panel of box

List Eligible Products Purchased:

<table>
<thead>
<tr>
<th>Qty</th>
<th>Serial #</th>
<th>Rebate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

TOTAL REBATE CLAIMED: $
No Time Like the Present!

Save $100

when you purchase a Sharp VL-WD650U,
VL-WD450U or VL-WD255U Digital Viewcam
Request must be postmarked by February 2, 2002.
Mail-in-Rebate

• What is the manufacturer trying to achieve with the rebate?
  - Why the manufacturer and not the retailer?
• Should the manufacturer reduce the wholesale price instead of the rebate?
• Are there other strategies that can be used to achieve the same effect?
Mail-in-Rebate

- A retailer and a manufacturer.
  - Retailer faces customer demand.
  - Retailer orders from manufacturer.

<table>
<thead>
<tr>
<th>Selling Price=?</th>
<th>Retailer</th>
<th>Manufacturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wholesale Price=$900</td>
<td>Variable Production Cost=$200</td>
<td></td>
</tr>
</tbody>
</table>
Demand-Price Relationship

P = 2000 - 0.2Q
Retailer Expected Profit (No Rebate)

$1,370,096
Manufacturer Profit
(No Rebate)
Manufacturer Profit (No Rebate)

$1,750,000
Retailer Expected Profit
($100 Rebate)
Retailer Expected Profit ($100 Rebate)

$1,644,115

Order

Retailer Expected Profit

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Manufacturer Profit
($100 Rebate)
Manufacturer Profit
($100 Rebate)

$1,810,392
Retailer Expected Profit
(Reduced Wholesale Price $100 )
Retailer Expected Profit (Reduced Wholesale Price $100)

Order

Retailer Expected Profit

$1,654,508
Manufacturer Profit
(Reduced Wholesale Price $100)
Manufacturer Profit
(Reduced Wholesale Price $100)

$1,800,000
## Mail-in-Rebate

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Retailer</th>
<th>Manufacturer</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Rebate</td>
<td>1,370,096</td>
<td>1,750,000</td>
<td>3,120,096</td>
</tr>
<tr>
<td>With Rebate ($100)</td>
<td>1,644,115</td>
<td>1,810,392</td>
<td>3,454,507</td>
</tr>
<tr>
<td>Reduce Wholesale P ($100)</td>
<td>1,654,508</td>
<td>1,800,000</td>
<td>3,454,508</td>
</tr>
<tr>
<td>Global Optimization</td>
<td></td>
<td></td>
<td>3,929,189</td>
</tr>
</tbody>
</table>
• Mail in Rebate allows supply chain partners to move away from sequential strategies toward global optimization
  – Provides retailers with upside incentive
• Mail in Rebate outperforms wholesale price discount
Smart Pricing

• Customized Pricing
  - Revenue Management Techniques
    • Distinguish between customers according to their price sensitivity
  - Influence retailer pricing strategies
  - Move supply chain partners toward global optimization
• Dynamic Pricing
  – Changing prices over time without necessarily distinguishing between different customers
  – Find the optimal trade-off between high price and low demand versus low price and high demand
When does Dynamic Pricing Provide Significant Profit Benefit?

• Limited Capacity
• Demand Variability
• Seasonality in Demand Pattern
• Short Planning Horizon
The Internet makes Smart Pricing Possible

- Low Menu Cost
- Low Buyer Search Cost
- Visibility
  - To the back-end of the supply chain allows to coordinate pricing, production and distribution
- Customer Segmentation
  - Difficult in conventional stores and easier on the Internet
- Testing Capability